

WHAT IS CLAIMED IS

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1. A handover control method that switches a radio base station serving as a communicating counterpart of a mobile station comprising:

10 detecting whether any of mobile stations communicating with the radio base station become incapable of communicating while a predetermined minimum bandwidth secured; and

15 switching the communicating counterpart of the mobile station that communicates with said radio base station from said radio base station to another radio base station.

2. A handover control method that switches the radio base station serving as the communicating counterpart of the mobile station, comprising:

20 detecting whether any of mobile stations communicating with the radio base station become incapable of communicating while the predetermined minimum bandwidth secured; and

25 switching the communicating counterpart of the mobile station that communicates with said radio base station from said radio base station to a plurality of other radio base stations.

30 3. The handover control method as claimed in claim 1 or 2, wherein

35 a radio base station whose electric field intensity was the strongest and a mobile station that measured it are selected as the mobile station as the object of the handover and the radio base station serving as the communicating counterpart thereof, excepting a set of the mobile station and

the radio base station under current communication,
based on electric field intensity information about
the radio base stations obtained from each mobile
station.

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4. The handover control method as claimed
in claim 1 or 2, wherein

a mobile station to which allocation of
radio resources is the nearest to the minimum
10 bandwidth and a radio base station which has the
most radio resources available are selected as the
mobile station and the radio base station for the
handover object.

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5. The handover control method as claimed
in claim 1 or 2, wherein

a mobile station that requires the radio
resources in the highest value of the minimum
bandwidth and a radio base station in which the
20 radio resources are available the most are selected
as the mobile station and the radio base station for
the handover object.

6. The handover control methods as claimed
25 in any one of claims 1 through 5, wherein

the detection of an inability to
communicate while the predetermined minimum
bandwidth secured at any of mobile stations that
communicate with the radio base station is realized
30 by measuring an electric field intensity, a bit
error rate, a frame error rate, a packet error rate,
a packet discarding rate, or any combination thereof
and basing on the measuring result thereof.

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7. The handover control methods as claimed
in any one of claims 1 through 6, wherein

said mobile station selects a radio base

station that serves as the communicating counterpart after said switching.

8. The handover control methods as claimed
5 in any one of claims 1 through 6, wherein
the radio base station which serves as the
communicating counterpart after said switching is
selected by a node other than said mobile station;
information indicative of the selected
10 radio base station is reported to said mobile
station from said node; and
the radio base station which serves as the
communicating counterpart of said mobile station is
switched to the reported radio base station.

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9. The handover control methods as claimed
in any one of claims 1 through 8, comprising
detecting when a communication securing a
predetermined minimum bandwidth becomes impossible
20 at any of mobile stations that are communicating
with a radio base station in a first radio
communication system that employs a first
communication protocol; and
transferring information relative to radio
25 resources of said mobile station from said first
radio communication system to said second radio
communication system via a wired section upon
converting the protocol,
when switching the communicating
30 counterpart of the mobile station that communicates
with said radio base station to the second radio
base station that employs the second communication
protocol when said detection was made.

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10. A handover control method which
switches a radio base station which serves as the
communicating counterpart of a mobile station,

comprising:

deciding as to whether communication of a radio base station will be in a traffic congestion condition;

5 selecting a combination of a mobile station that communicates with said radio base station and one or more radio base stations with which said mobile station can communicate according to a predetermined standard when the decision is
10 made that the communication of the radio base station will become congested; and

 switching the communicating counterpart of the mobile station in the selected combination to one or more radio base stations in the combination.
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 11. The handover control method as claimed in claim 10, wherein
 the predetermined standard for selecting a combination of said mobile station and a radio base
20 station is defined based upon an available amount of radio resources of a radio base station or an amount of the radio resources required.

 12. The handover control methods as
25 claimed in claim 10 or 11, wherein
 the predetermined standard for selecting the combination of said mobile station and a radio base station is defined based upon receiving electric field intensity of the communication
30 between the mobile station and the radio base station.

 13. The handover control methods as claimed in any one of claims 10 through 12, wherein
35 the predetermined standard for selecting the combination of said mobile station and a radio base station is defined based upon the ratio of the

amount of radio resources permitted to the mobile station to the amount of radio resources currently used in fact.

5 14. The handover control methods claimed
in any one of claims 10 through 13, wherein
the predetermined standard for selecting
the combination of said mobile station and a radio
base station is defined based upon the number of the
10 radio base stations which should perform
simultaneous communications after switching the
communicating counterpart.

15 15. The handover control methods as
claimed in any one of claims 10 through 14, wherein
the predetermined standard for selecting
the combination of said mobile station and a radio
base station is defined based upon whether the radio
base station which is performing the current
20 communication is included in the radio base stations
with which the mobile station is to communicate
after switching the communicating counterpart.

25 16. The handover control method as claimed
in any one of claims 10 through 15, wherein
a priority about the appropriateness of
mutual communication is given to combinations of
each mobile station that communicates with said
radio base station and said radio base station and
30 one or more of radio base stations adjacent to the
radio base station in accordance with said
predetermined standard; and
a selection is made in favor of the
combination of a mobile station and a radio base
35 station with a higher priority.

17. The handover control methods as

claimed in any one of claims 10 through 16, wherein
the process for selecting a combination of
any of mobile stations that communicate with said
radio base station and one or more radio base
stations that can communicate with said mobile
station is performed by a node that is connected to
each radio base station via a wired section.

18. The handover control methods as
claimed in any one of claims 10 through 16, wherein
a mobile station that communicates with
said radio base station performs the process for
selecting a combination of said mobile station and
one or more radio base stations with which said
mobile station can communicate according to said
predetermined standard.

19. The handover control method as claimed
in claim 18, wherein
said mobile station which communicates
with said radio base station determines whether said
radio base station is in a traffic congestion
condition.

20. The handover control methods as
claimed in any one of claims 1 through 19, wherein
the communication conditions between the
mobile station and one or more radio base stations
are supervised after switching the communicating
counterpart of said mobile station to said one or
more radio base stations; and
a process is performed such that the
communicating counterpart of said mobile station may
be switched again when the supervised communication
condition turned into a condition poorer than the
predetermined standard condition.

21. The handover control method as claimed
in claim 20, wherein

an error rate in communication between a
mobile station and one or more radio base stations
5 is supervised as said communication condition.

22. A handover system that switches radio
base stations as the communicating counterpart of a
mobile station, comprising:

10 detection means for detecting an inability
of any of mobile stations that are communicating
with a radio base station to communicate while a
predetermined minimum bandwidth condition secured;
and

15 switching control means for switching the
communicating counterpart of the mobile station
communicating with said radio base station from said
radio base station to another base station when said
detection means detected that any mobile station is
20 unable to communicate while the predetermined
minimum bandwidth condition secured.

23. A handover control system that
switches radio base stations as the communicating
25 counterpart of a mobile station, comprising:

detection means for detecting an inability
of any of mobile stations that are communicating
with a radio base station to communicate while a
predetermined minimum bandwidth condition secured;
30 and

switching control means for switching the
communicating counterpart of the mobile station
communicating with said radio base station from said
radio base station to a plurality of other base
35 stations when said detection means detected that any
mobile station is unable to communicate while the
predetermined minimum bandwidth condition secured.

24. The handover control system as claimed
in claim 22 or 23, wherein

5 said switching control means comprises
selection means for selecting a radio base station
whose electric field intensity is the strongest and
the mobile station that measured it as the mobile
station and the radio base station serving as the
10 communicating counterpart for the handover, based on
the electric field intensity information relative to
radio base stations obtained from each mobile
station, excepting the combination of the mobile
station and the radio base station in current
communication.

15 25. The handover control system as claimed
in claim 22 or 23, wherein

20 said switching control means comprises
selection means for selecting a combination of a
mobile station that is assigned an amount of radio
resources the closest to the minimum bandwidth and a
radio base station where the radio resources are
available the most as the mobile station and the
radio base station for the handover.

25 26. The handover control system as claimed
in claim 22 or 23, wherein

30 said switching control means comprises
selection means for selecting a combination of a
mobile station that requires a large amount of the
radio resource with the highest value of the minimum
bandwidth and a radio base station where the radio
resources are available the most as the mobile
station and the radio base station for the handover.

35 27. The handover control system as claimed
in any one of claims 22 through 26, wherein

said detection means comprises measurement means for measuring an electric field intensity, bit error rate, a frame error rate or a packet discarding rate, or any combinations thereof, and
5 the detection of the inability to communicate of any mobile stations that are communicating with the radio base station while the predetermined minimum bandwidth secured, based on measurement results by said measurement means.

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28. The handover control system as claimed in any one of claims 22 through 27, wherein

15 said mobile station selects the radio base station serving as the communicating counterpart after said switching.

29. The handover control system as claimed in any one of claims 22 through 27, wherein,

20 the radio base station which serves as the communicating counterpart after said switching is selected by a node other than said mobile station;

the information on the selected radio base station is reported to said mobile station from said node; and

25 the switching is made to the reported radio base station as the base station to serve as the communicating counterpart of said mobile station.

30 30. The handover control system as claimed in any one of claims 22 through 29, wherein

35 said detection means detects that any mobile station among mobile stations under communication with a radio base station of the first radio communication system that employs the first communication protocol becomes unable to communicate in the condition that the predetermined minimum bandwidth is secured,

said handover control system comprising means that transfers information about radio resources of said mobile station from said first radio communication system to said second radio communication system upon protocol conversion when the communicating counterpart of the mobile station that communicates with said radio base station is switched to a radio base station in the second radio communication system that employs the second communication protocol by said switching control means when said detection means makes said detection

31. In handover control systems that switch a radio base station which serves as communicating counterpart of a mobile station, comprising:

traffic congestion checking means for deciding whether communication of a radio base station will be in a traffic congestion condition;

20 selection means for selecting a
combination of any mobile station that is
communicating with said radio base station and one
of a plurality of radio stations with which
communication is possible with said mobile station
25 in accordance with a predetermined standard when
said traffic congestion checking means determines
that the radio base station will be in a traffic
congestion condition; and

switching control means for switching the
30 communicating counterpart of the mobile station in
the selected combination to one or more radio base
stations in the combination.

32. The handover control system as claimed
35 in claim 31, wherein

the predetermined standard for selecting a combination of said mobile station and radio base

station is defined based on the amount of available radio resources in the radio base station, or the amount of radio resources required.

5 33. The handover control system as claimed in claim 31 or 32, wherein

 the predetermined standard for selecting a combination of said mobile station and a radio base station is defined based upon the receiving electric
10 field intensity in communication between mobile stations and radio base stations.

 34. The handover control system as claimed in claim 31 or 33, wherein

15 the predetermined standard for selecting a combination of said mobile station and a radio base station is defined based upon the ratio of the amount of radio resources permitted to the mobile station to the amount of radio resources currently
20 used in fact.

 35. The handover control system as claimed in any one of claims 31 through 34, wherein

 the predetermined standard for selecting a
25 combination of said mobile station and a radio base station is defined based upon the number of the radio base stations which should perform simultaneous communication after switching the communicating counterpart.

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 36. The handover control system as claimed in any one of claims 31 through 35, wherein

 the predetermined standard for selecting a combination of said mobile station and a radio base
35 station is defined based upon whether the radio base station which is performing the current communication is included.

37. The handover control system as claimed in any one of claims 31 through 36, wherein,

said selection means gives the priority
5 about the appropriateness of mutual communication to
combinations of each mobile station that
communicates with said radio base station and said
radio base station and one or more adjacent radio
base stations; and

10 a combination of a mobile station and a
radio base station which is given with the highest
priority is selected.

38. The handover control system as claimed
15 in any one of claims 31 through 37, wherein
said selection means is provided in a node
connected to each radio base station via a wired
section.

20 39. The handover control system as claimed
in any one of claims 31 through 37, wherein
a mobile station which communicates with
said radio base station selects a combination of
said mobile station and one or more radio base
25 stations with which communication is possible in
accordance with said predetermined standard.

40. The handover control system as claimed
in claim 39, wherein
30 said mobile station that communicates with
said radio base station comprises said traffic
congestion detection means.

41. The handover control system as claimed
35 in any one of claims 22 through 40, comprising:
communication condition supervision means
for supervising the communication condition between

the mobile station and one or more radio base stations after switching the communicating counterpart of said mobile station to said one or more radio base stations;

5 condition decision means for deciding whether the communication condition supervised by said communication condition supervision means will be in a condition poorer than the predetermined standard condition; and

10 re-switching control means for performing process for switching the communicating counterpart of said mobile station again when said condition decision means determines that the communication condition as supervised is in a condition poorer
15 than the predetermined standard condition.

42. The handover control system as claimed in claim 41, wherein

20 said communication condition supervising means comprises error rate detection means for supervising an error rate in communication between a mobile station and one or more radio base stations as said communication condition.